C/015/019 Incoming

#3600
K

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

COPY

P.O. Box 310
15 North Main Street
Huntington, Utah 84528

July 30, 2010

Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

Subj: Application for Phase II and Phase III Bond Release of the Cottonwood/Wilberg Fan Portal Area, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company ("Energy West"), as mine operator, hereby submits an application for Phase II and Phase III bond release of the Cottonwood/Wilberg Fan Portal area. The said area covered by the bond is approximately 7.46 acres and is located in E½ of Section 25, Township 17 South, Range 6 East, SLB&M. This area has met the regulations of the R645 Utah Coal Rules in regards to both Phase II and III bond release (R645-301-880.310).

The information included with this application provides documentation as required by Directive Number: Tech-006 and the R645-301-800 Utah Coal Regulations. This information is included as Attachments 1 through 11 and as follows:

General Information for Bond Release

Attachment 1: Notarized Signature
Attachment 2: Draft Letters to Interested Parties
Attachment 3: Draft Newspaper Advertisement
Attachment 4: Legal Description and Site Map
Attachment 5: Reclamation Treatments Utilized
Attachment 6: Cottonwood/Wilberg Mine Cottonwood Fan Portal Site General History of Mining and Reclamation Activities
Attachment 7: Current Total Bond Amount and Incremental Amount Requested for Release

Information for Phase II Bond Release

Attachment 8: Vegetation Analysis for Last Two Years of Responsibility
Attachment 9: Demonstration that Area is Not Contributing Suspended Solids Outside Permit Area

Information for Phase III Bond Release

Attachment 10: Demonstration that Responsibility Period has been Met
Attachment 11: Demonstration that Post Mining Land Use has been Achieved

File in:
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☐ Shelf
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In C/015/0019, Incoming
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When Phase III Bond Release procedures are complete and application approved, the Cottonwood Mine MRP and Legal/Financial Volumes will be revised to reflect the changes to the mining and reclamation permit. The required C1 form is included with this application. Additional information for this site can be reviewed in the application for Phase I Bond Release of the Cottonwood Fan Portal Area approved March 16, 2004 (C/015/019-BR00D-5, Task ID #1033) contained in your files. If you have any questions or concerns regarding the enclosed information, please contact Dennis Oakley at 435-687-4825.

Sincerely,

for Dennis Oakley

Ken Fleck
Geology and Environmental Affairs Manager

Enclosures: C1 Form
Attachments 1 through 11

Cc: Scott Child w/o attachments (Interwest Mining Company)
DOGM, PFO w/attachments
file

APPLICATION FOR COAL PERMIT PROCESSING

COPY

Permit Change [ ] New Permit ☐ Renewal ☐ Exploration ☐ Bond Release ☒ Transfer ☐

Permittee: PacifiCorp

Mine: Cottonwood/Wilberg Mine **Permit Number:** C/015/0019

Title: Application for Phase II and Phase III Bond Release of the Cottonwood Fan Portal Area, PacifiCorp, Cottonwood/Wilberg Mine, C/015/0019, Emery County, Utah

Description, Include reason for application and timing required to implement:

Phase II and III Bond release of satelite facility. Timing: As required by Utah Coal Regulations

Instructions: If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

☐ Yes ☒ No 1. Change in the size of the Permit Area? Acres: _____ ☐ increase ☐ decrease.
☐ Yes ☒ No 2. Is the application submitted as a result of a Division Order? DO# _____
☐ Yes ☒ No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes ☒ No 4. Does the application include operations in hydrologic basins other than as currently approved?
☐ Yes ☒ No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
☒ Yes ☒ No 6. Does the application require or include public notice publication?
☐ Yes ☒ No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☐ Yes ☒ No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes ☒ No 9. Is the application submitted as a result of a Violation? NOV # _____
☐ Yes ☒ No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
☒ Yes ☐ No 11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes ☒ No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
☐ Yes ☒ No 13. Does the application require or include collection and reporting of any baseline information?
☐ Yes ☒ No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes ☒ No 15. Does the application require or include soil removal, storage or placement?
☒ Yes ☐ No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☐ Yes ☒ No 17. Does the application require or include construction, modification, or removal of surface facilities?
☐ Yes ☒ No 18. Does the application require or include water monitoring, sediment or drainage control measures?
☐ Yes ☒ No 19. Does the application require or include certified designs, maps or calculation?
☐ Yes ☒ No 20. Does the application require or include subsidence control or monitoring?
☒ Yes ☐ No 21. Have reclamation costs for bonding been provided?
☐ Yes ☒ No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
☐ Yes ☒ No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

Please attach four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Kenneth Fleck
Print Name

Kenneth S. Fleck Manager of Environmental Affairs 7/28/10
Sign Name, Position, Date

Subscribed and sworn to before me this 28th day of July, 20 10

Chris M. Christensen
Notary Public

My commission Expires: April 24, 2011

Attest: State of Utah }
County of Emery } ss:

NOTARY PUBLIC
CHRIS M CHRISTENSEN
51 N Main
Huntington, Utah 84528
My Commission Expires
April 24, 2011
STATE OF UTAH

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining
		RECEIVED AUG 03 2010 DIV. OF OIL, GAS & MINING

Form DOGM- C1 (Revised March 12, 2002)

Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 1
Notarized Signature

PacifiCorp
Energy West Mining Company
Cottonwood/Wilberg Mine
C/015/0019

Phase II and III Bond Release on Approximately 7.47 Acres of Land Related to the Cottonwood Fan Portal Site.

I hereby certify, to the best of my knowledge and belief, that all the information contained in this request is true and correct and that all applicable reclamation activities have been accomplished in accordance with the requirements of the Act, the regulatory program, and the approved reclamation plan.

Kenneth Fleck, Manager of Geology and Environmental Affairs

Print Name

Kenneth S. Fleck 7/28/10

Signature, Position, Date

Subscribed and sworn to before me this 28th day of July, 2010.

Chris M. Christensen

Notary Public

NOTARY PUBLIC
CHRIS M CHRISTENSEN
51 N Main
Huntington, Utah 84528
My Commission Expires
April 24, 2011
STATE OF UTAH

My Commission Expires: April 24, 2011
Attest: State of Utah
County of Emery

Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 2
Draft Letters to Interested Parties

August xx, 2010

Interested Party Member
1001 Any Street
Any City, USA 10110

Subject: **Application for Phase II and III Bond Release, Cottonwood Fan Portal Area of the Cottonwood/Wilberg Mine**

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company ("Energy West") as mine operator, has filed with the Division of Oil, Gas and Mining an application for Phase II and III Bond Release for 7.47 acres of the Cottonwood Fan Portal Area of the Cottonwood/Wilberg Mine.

As required by the State of Utah, R645-Coal Mining Rules (R645-301-880), all adjoining property owners, local governmental bodies, etc, are notified, informing them of the operator's intention to seek release from bond. You are receiving this notice because of your association with one of the groups mentioned above. A public notice was published in the Emery County Progress commencing on August xx, 2010 and will run for four (4) consecutive weeks.

The Cottonwood Fan Portal Area is located in the E1/2 of Section 25, Township 17 South, Range 7 East, SLB&. The surface and subsurface lands are owned and controlled by the Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-Day Saints (LDS Church). PacifiCorp is the Leasee of Record for these lands to conduct surface and underground mining activities. Mining activities in this area are no longer being conducted. Total disturbance associated with the Cottonwood Fan Portal site is approximately 7.47 acres.

This portal site was initially disturbed under an exploration permit issued by the State of Utah for determining subsoil engineering design data for a major portal facility. This site included two small soil stockpiles, and a disturbed drainage collection system with two small sedimentation basins at the bottom of the slope. Following updated plans and mining needs, the once proposed fan portal was no longer required. Subsequently, final reclamation of the disturbed area was initiated. Approximately half of the disturbed area was reclaimed in 1981. The remaining portion was completed in November of 1998. The remaining 1.86 acres of disturbed area within the vicinity of the Cottonwood Fan Portal Area includes a soil stockpile area and a sealed portal site [belt and travelway] for the Cottonwood Mine. The sedimentation basins were reclaimed in June of 2002. Phase I bond release was approved on March 16, 2004.

A Surety bond is posted with the Division for the Cottonwood/Wilberg mine in the amount of $3,252,000.00. PacifiCorp is requesting Phase II and Phase III release of reclamation liability. The incremental bond release that is being requested is $109,791.00(2010 dollars).

If you have any questions, comments, or concerns that require further information pertaining this bond release application, please feel free to call Dennis Oakley at (435) 687-4825.

Sincerely,

Dennis Oakley
Sr. Environmental Engineer

Cc Gary Kofford, Chairman, Emery County Board of Commissioners
Pamela Brown, Forest Supervisor, USFS, Region 4, Manti-LaSal National Forest
Dr. Phil Notorianni, Jr., Director, State Historic Preservation Office
Eric Larson, Regional Supervisor, State of Utah, Division of Wildlife Resources
Kyle Kingsbury, Minerals Manager, The Church of Jesus Christ of Latter-Day Saints
File

Notification List:

Gary Kofford, Chairman
Emery County Board of Commissioners
P.O. Box 629
Castle Dale, Utah 84513

Jerry Kenczka, Field Office Manager
Bureau of Land Management
Price Field Office
125 South 600 West
Price, Utah 84501

Pamela Brown, Forest Supervisor
United States Forest Service
Region 4, Manti-LaSal National Forest
599 West Price River Road
Price, Utah 84501

Dr. Phil Notorianni, Jr., Director
State Historic Preservation Office
300 Rio Grande
Salt Lake City, Utah 84101

Eric Larson, Regional Supervisor
State of Utah
Division of Wildlife Resources
SOUTHEASTERN REGION
319 North Carbonville Rd., Suite A
Price, Utah 84501

Mark Stilson, Regional Engineer
State of Utah
Division of Water Rights
Southeastern Area
319 Carbonville Rd, Suite B
Price, Utah 84501

Janis Smith
Closing/Lease Coordinator
The Church of Jesus Christ of Latter-Day Saints
Real Estate Services Division
50 East North Temple, Room 1205
Salt Lake City, Utah 84150-6320

Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 3
Draft Newspaper Advertisement

Application for Phase II and III Bond Release
Cottonwood/Wilberg Mine
Cottonwood Fan Portal Area
C/015/0019
Energy West Mining Company
P.O. Box 310
Huntington, Utah 84528

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company ("Energy West") as mine operator, has filed with the Division of Oil, Gas and Mining an application for Phase II and III Bond Release for 7.47 acres of the Cottonwood Fan Portal Area of the Cottonwood/Wilberg Mine.

The Cottonwood Fan Portal Area is located in the E1/2 of Section 25, Township 17 South, Range 7 East, SLB&. The surface and subsurface lands are owned and controlled by the Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-Day Saints (LDS Church). PacifiCorp is the Leasee of Record for these lands to conduct surface and underground mining activities. Mining activities in this area are no longer being conducted. Total disturbance associated with the Cottonwood Fan Portal site is approximately 7.47 acres.

This portal site was initially disturbed under an exploration permit issued by the State of Utah for determining subsoil engineering design data for a major portal facility. This site included two small soil stockpiles, and a disturbed drainage collection system with two small sedimentation basins at the bottom of the slope. Following updated plans and mining needs, the once proposed fan portal was no longer required. Subsequently, final reclamation of the disturbed area was initiated. Approximately half of the disturbed area was reclaimed in 1981. The remaining portion was completed in November of 1998. The remaining 1.86 acres of disturbed area within the vicinity of the Cottonwood Fan Portal Area includes a soil stockpile area and a sealed portal site [belt and travelway] into the Cottonwood Mine. The sedimentation basins were reclaimed in June of 2002. Phase I bond release was approved on March 16, 2004.

A Surety bond is posted with the Division for the Cottonwood/Wilberg mine in the amount of $3,252,000.00. PacifiCorp is requesting Phase II and Phase III release of reclamation liability. The incremental bond release that is being requested is $109,791.00(2010 dollars).

A copy of the Phase III Bond Release application may be examined at the office of the Division of Oil, Gas and Mining, 1594 West North Temple, Suite 1210, Salt Lake City, Utah 84114-5801 and also at the Recorders Office located in the Emery County Courthouse in Castle Dale, Utah. Written comments, objections, or requests for an informal conference may be submitted to the Division of Oil, Gas, and Mining address above. Said comments must be submitted thirty (30) days from the date of the last publication of this notice.

This notice is being published to comply with the Surface Mining Control and Reclamation Act of 1977, and State and Federal regulations promulgated pursuant to said Act.

Published in the Emery County Progress for four consecutive weeks beginning August xx, 2010.

Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 4
Legal Description and Map

Legal Description for Phase II and III Bond Release

The area under application for release of the Cottonwood Fan Portal area consists of a small reclaimed area within the E1/2 of Section 25, Township 17 South, Range 7 East, SLB&M. This area contains approximately 7.47 acres of land that was partially reclaimed in 1981 (2.2 acres) and partially reclaimed in 1998 (5.27 acres).

Refer to the attached drawing for the location of the Cottonwood Fan Portal Area.

Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 5
Reclamation Treatments

Reclamation Treatments Utilized at the Cottonwood Fan Portal Area

Surveys conducted during the spring of 1997 indicated that the feasibility to reclaim all areas of the excavated Cottonwood Fan Portal site were not feasible. Site evaluations were conducted by a disciplinary action team from the Division and PacifiCorp (Energy West) personnel during early 1997 and established that certain alterations were necessary in reclamation efforts on this particular site.

Energy West surveyed all benches and delineated in the field slope locations and extent of fill as deemed necessary. Energy West also committed to soil placement beyond the slope toes and to the natural downslope of designated bench or terrace areas. Rock placement and distribution was planned to assist in erosion control, stabilize fill, and improve aesthetics.

Subsoil and Topsoil Placement:
Top and subsoil were excavated from the storage piles and hauled up the Old Johnson Mine access road and temporarily stockpiled at the flat area in front of the southern portal of the Old Johnson Mine. The material was hauled, from the temporary stockpile to the individual terraces. A total of four (4) terraces were reclaimed. Backfilling of the four terraces and the Old Johnson Mine access road allowed this area to resemble the surrounding environment and achieved approximate original contour and highwall elimination.

Upper Diversion Bench and Diversion Ditch:
During the initial on-site evaluation, the upper diversion terrace was discussed. It was considered, at that time, beneficial for the terrace to remain in place and not be restored to original contour. Some minor modifications proved necessary to provide the drainage along said terrace. These modifications included rerouting the drainage on the south end of the diversion ditch to direct surface flow to a natural drainage channel.

After soil placement of the terraces was complete, straw mulch was incorporated at a rate of 2000 lbs/acre. The straw was mixed into the topsoil layer using a track-hoe. This process added organic content and structure to the soil. The soil was then deep gouged (pocked) throughout the reclaimed area to maximize moisture retention and erosion control. Once pocking of each terrace was completed, fertilizer was hand broadcast at a rate of; 1) Ammonium nitrate at 50 lbs/acre, and 2) Triple superphosphate at 75 lbs/acre. The approved seed mix was applied hydraulically.

The revegetated areas were mulched with a wood fiber hydromulch and applied at a rate of 2000 lbs/acre and a tackifier applied at a rate of 150 lbs/acre. These applications were combined and applied in a one-step process. The seeding process was separate and prior to the mulching applications.

Seed Mixture:
A revised seed mixture was selected wherein all introduced species were eliminated. The seed mix adopted for the fan portal area is listed in the table below. Shrub plantings were applied by hand broadcasting seed at the time of regular seeding process.

Sediment Control Structure Removal:
The sediment basins at the Cottonwood Fan Portal were backfilled and reclaimed once vegetation was established on the portal site. Basins were reclaimed in July, 2002.

Seed Mixture - Final Revegetation for the Cottonwood Fan Portal

Common Name	Scientific Name	Lbs/Acre PLS*
Grasses		
Western wheatgrass	Agropyron smithii	3
Bluebunch wheatgrass	Agropyron spicatum	3
Indian ricegrass	Oryzposis hymenoides	3
Needle and thread grass	Stipa comata	1
Thickspike wheatgrass	Agropyron dasystachyum	1
Great Basin wildrye	Elymus ciaereus	2
Forbs		
Blueleaf aster	Aster glaucodes	0.5
Utah sweet vetch	Hedysarum boreale	1
Lewis flax	Linum lewisii	1
Globemallow	Sphaeralcea coccinea	0.5
Yarrow	Achillea millefolius	0.5
Palmer penstemon	Penstemon palmeri	1
	Total	17.5

*Application rates result in approximately 80 seeds/ft^2.

Shrubs		
Serviceberry	Amelanchier alnifolia	1
Fourwing saltbush	Atriplex canescens	2
Green Mormon tea	Ephedra viridis	1
Wyoming big sagebrush	Artemesia wyoningensis	0.5
Big white rabbitbrush	Chrysothamunus nauseosus var. albicaulis	0.5
	Total	5

Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 6
General History of the Site

General History of Cottonwood Fan Portal Area

The original development plans for the Wilberg Mine centered on extending the main entries westward to intersect the coal outcrop located in Cottonwood Canyon four miles west of the main portals.

It was anticipated a ventilation exhaust fan would be needed at the time in early 1983. However, with the breakout or air intakes constructed in the Miller Canyon (Phase II and III applied for in July 2010) and the shift in mining emphasis to the South (Cottonwood) lease, the fan portal installation was terminated.

This portal site initially was disturbed under an exploration permit issued by the State of Utah for determining subsoil engineering design data for the portal facility. This approximately 8.0 acre site included two small soil stockpiles, and a disturbed drainage collection system with two small sedimentation basins. Following updated plans and mining needs, the once proposed fan portal was no longer required. Subsequently, final reclamation of the disturbed area was initiated. Approximately half of the disturbed area (2.2 acres) was reclaimed 1.86 acres of disturbed area within the vicinity of the Cottonwood Fan Portal Area includes a soil stockpile area and a sealed portal site [belt and travelway] for the Cottonwood Mine.

The Cottonwood Fan Portal Area also includes an old abandoned coal mine (Johnson Mine). Remnants include an old wagon road and two sealed portals. The State Abandon Mined Lands Program reclaimed those portals in 1999. During the construction phase for the proposed fan portal site, the old wagon road was upgraded and utilized for facing off the proposed fan area. The roadway was reclaimed to some degree in 1981. In 1998, the roadway was reused to access the terrace areas for reclamation. This road was again reclaimed to a point north of the existing bent structure.

Once the vegetation was established on the reclaimed site, the sedimentation basins were reclaimed. This project occurred in June of 2002. Phase I bond release was originally applied for in June of 2000 and finally approved on March 16, 2004.

Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 7
Current Total Bond Amount and Incremental Amount Requested for Release

Current Total Bond Amount and Incremental Amount Requested for Release

The bond for the Cottonwood/Wilberg Mine was updated by DOGM in May 2007. At that time, the incremental bond amount calculated for the Cottonwood Fan Portal area was $85,305.00 (direct costs) and $22,863.00 (indirect costs). Calculating to today's values, total incremental bond amount for the Cottonwood Fan Portal Area equals $109,791.00. PacifiCorp is requesting that the surety for the Cottonwood Mine to be reduced or released by this amount as outlined in the table below.

	Direct Costs*	Indirect Costs*	2007	2010
1	Earthwork		$43,282.00	$43,931.00
2	Revegetation		$42,023.00	$42,653.00
3	**Subtotal**		**$85,305.00**	**$86,585.00**
4		Mob/Demob	$8,531.00	$8,659.00
5		Contingency	$4,265.00	$4,329.00
6		Engineering Redesign	$2,133.00	$2,165.00
7		Office Expense	$5,801.00	$5,888.00
8		Project Management	$2,133.00	$2,165.00
9		**Subtotal**	**$22,863.00**	**$23,206.00**
10	**Total (3+9)**		**$108,168.00**	**$109,791.00**

* Refer to Cottonwood/Wilberg MRP, Volume 2, Part 4, Appendix C, Bond Summary Page

Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 8
Vegetation Analysis (2007/2008 Field Seasons)

VEGETATION MONITORING
FOR PHASE III BOND RELEASE: YEAR 1
AT THE
COTTONWOOD FAN PORTAL AREA
2007

RECLAIMED SLOPE '81
RECLAIMED SLOPE '98
AND THE
PINYON-JUNIPER REFERENCE AREA

Prepared by

MT. NEBO SCIENTIFIC, INC.
330 East 400 South, Suite 6
P.O. Box 337
Springville, Utah 84663
(801) 489-6937

Patrick D. Collins, Ph.D.

for

ENERGY WEST MINING COMPANY
P.O. Box 310
Huntington, Utah 84528

March 2008

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VEGETATION MONITORING
FOR PHASE III BOND RELEASE: YEAR 1
AT THE
COTTONWOOD FAN PORTAL AREA
2007

INTRODUCTION

Following final reclamation and revegetation of a mine site, a "*responsibility period*" for at least 10 years is required before the mine operator can submit a request for *Final or Phase III Bond Release* through the State of Utah, Division of Oil, Gas & Mining (DOGM). This period of time is thought to be long enough to determine whether or not adequate re-establishment of the reclaimed plant community has occurred on the site. The vegetation is usually monitored throughout this time period, but beginning at year 9 of the 10-year period, intensive sampling can be initiated for two consecutive years to determine whether or not the reclaimed site has met pre-determined revegetation success standards. The re-established vegetation of the reclaimed land must meet specific state and federal requirements as specified by the State of Utah, Division of Oil, Gas & Mining. As dictated by the rules, vegetative cover must be "*diverse, effective and permanent*". Accordingly, there are often specific requirements associated with cover, density, production and diversity of reclaimed lands. Success standards for two reclaimed slopes within the Cottonwood Fan Portal Area, the **Reclaimed Slope '81** and the **Reclaimed Slope '98**, had pre-determined specific parameters to be compared from a native, undisturbed plant community located nearby called the **Pinyon-Juniper Reference Area**.

The purpose of this document was to compare results of the quantitative data and indices formulated from it, of the reclaimed slopes to that of the reference area. The contents of this report provide **Year 1** results of the two consecutive years of sampling required prior to submittal of an application for Phase III Bond Release by the mine operator through DOGM.

General Site Description

The Cottonwood Fan Portal Area is located in Cottonwood Canyon, approximately 12 miles northwest of Orangeville, Utah. Elevation of the study sites ranged between 7,100 ft and 7,600 ft above sea level. Slopes of the study areas were relatively steep at approximately 35 degrees with exposures primarily to the west-southwest.

The descriptive name provided for the "Reclaimed Slope '81" implies the slope's general history – it is a reclaimed slope where the plant communities that once existed in the area were disturbed by previous mining activities, then were reclaimed and re-seeded in 1981.

Prior to disturbance, the native vegetation was most likely dominated by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osterosperma*), with Salina wildrye (*Elymus salinus*) as the dominant understory species.

Similarly named, the "Reclaimed Slope '98" was also the site of previous disturbance and was reclaimed and re-seeded in 1998. With similar slopes and exposures as the Reclaimed Slope '81,

this area was also likely dominated by the same plant species before it was disturbed by mining activities.

A Pinyon-Juniper Reference Area was chosen earlier to be used to create standards for revegetation success following final reclamation. The reference area was dominated by the same plant species as those listed above for the reclaimed slopes (before they were disturbed). The reference area was chosen earlier to comply with guidelines provided by the State of Utah, Division of Oil, Gas & Mining (DOGM) and was thought to have similar slopes, soils, exposure, species composition, precipitation, elevation and other environmental variables.

METHODS

Vegetation establishment on the reclaimed slopes has been monitored for several years following slope reclamation. Sampling methods have remained consistent for all monitoring years and follow those methods suggested in guidelines provided by DOGM.

Transect Placement

Transect lines for quantitative sampling were randomly placed the length of the reclaimed slopes and reference areas to adequately represent each sample area as a whole. From these transect lines, sample locations were chosen using random numbers at right angles to them.

Cover, Frequency and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets were: estimated precipitation, slope, exposure, grazing use, animal disturbance and other appropriate notes. Plant nomenclature follows "A Utah Flora" (Welsh et al. 2003).

Density

Density estimates for the woody plant species on the reclaimed slopes and reference area were made using a distance method called the point-quarter method. In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual.

Production

Total annual biomass production was estimated by clipping, drying and weighing current annual growth in each sample quadrat. "Double sampling" methods were employed by placing four additional quadrats around the clipped quadrat, then estimating the production of them relative to the clipped plot. Herbaceous and woody species production were recorded separately.

Sample Adequacy

Sample adequacy for cover and density was attempted with the goal that 90% of the samples were within 10% of the true mean for the plant communities in the area. The following formula was used:

$$nMIN = \frac{t^2 s^2}{(dx)^2}$$

where,

nMIN	= minimum adequate sample
t	= appropriate confidence t-value
s	= standard deviation
x	= sample mean
d	= desired change from mean

Diversity

Two diversity indices have been reported in this document for the reclaimed area and the reference area. To begin, **MacArthur's Diversity Index** was calculated. This index is an effective diversity measurement and is computed using the equation $1/\sum pi^2$ (MacArthur and Wilson 1976, *The Theory of Island Biogeography,* Princeton: Princeton University Press). In this equation *pi* is the proportion of sum frequency contributed by the *i*th species in the sample area of concern. The proportional contribution of each species is then squared and the values for all species in the sample areas are summed. This index integrates the number of species and the degree to which frequency of occurrence was equitably distributed among those species. In other

words, this index provides greater weight to those species that are present more often (with greater frequency) than those that are merely "present" in one or two quadrats. The **average number of species** per sample quadrat is another measure of species diversity provided from the data in this report.

Photographs

Color photographs were taken of the sample areas and are included in this report.

RESULTS

Reclaimed Slope '81

Quantitative sampling the vegetation on the Reclaimed Slope '81 showed that the area was dominated by sagebrush (*Artemisia tridentata*), Great Basin wildrye (*Elymus cinereus*), fourwing saltbush (*Atriplex canescens*) and rubber rabbitbrush (*Chrysothamnus nauseosus*). For a list of all plant species present in sample quadrats along with the cover and frequency values, refer to Table 1.

The total living cover of this reclaimed slope was estimated at 48.30% (Table 2-A). Of that living cover, shrubs comprised 60.45% of it, grasses 31.44% and forbs 8.10% (Table 2-B). The total woody species density was estimated at 4,360 individuals per acre and was dominated by

sagebrush, rubber rabbitbrush and fourwing saltbush (Table 3). Total annual biomass production of the slope was estimated to be 1,395 pounds per acre, with 799 pounds coming from herbaceous species and 596 pounds from woody plants (Table 4).

Reclaimed Slope '98

The Reclaimed Slope '98 was dominated by Gt. Basin wildrye, Pacific aster (*Aster ascendens*), western wheatgrass (*Elymus smithii*) and Lewis flax (*Linum perenne* ssp. *lewisii*). For a list of all plant species present in sample quadrats along with their cover and frequency values, refer to Table 5.

The total living cover for this reclaimed slope was estimated to be 45.25% (Table 6-A). The composition of the cover by lifeform was 55.89% grasses, 25.18% forbs and 18.93% grasses (Table 6-B). Woody species density in this area consisted of 2,888 individuals per acre with the dominants for this parameter consisting of fourwing saltbush, rubber rabbitbrush sagebrush (Table 7). Productivity for the slope estimated at 1373 pounds per acre with 1035 pounds coming from herbaceous and 338 pounds from woody species (Table 8).

Pinyon-Juniper Reference Area

The reference area chosen earlier to be used for final revegetation success standard was located up-slope from the two reclaimed slopes in an undisturbed pinyon-juniper plant community. This

community was also sampled during the same period to enable the results to be compared to the results of the reclaimed slopes.

Overstory cover of the reference area was estimated at 4.08%, all from pinyon pine *(Pinus edulis)*. The understory living cover was dominated by Salina wildrye, rubber rabbitbrush, pinyon pine, Utah juniper (*Juniperus osteosperma*) and Mormon tea (*Ephedra viridis*). For a cover and frequency listing of all species present in the sample quadrats refer to Table 9.

The total living cover of the Pinyon-Juniper Reference Area was estimated at 33.67%, of which 29.58% was from understory cover and 4.08% from overstory (Table 10-A). The composition of this cover consisted of 60.37% grasses, 34.26% shrubs and 5.37% forbs (Table 10-B). Woody species density of this area consisted of 895 individuals per acre with the most common plants for this parameter consisting of pinyon-pine, rubber rabbitbrush, Mormon tea, Utah serviceberry (*Amelanchier utahensis*) and Utah juniper (Table 11). Total annual biomass production was estimated at 449 pounds per acre and was about equally represented by woody and herbaceous plants (Table 12).

Comparisons Between Areas

Statistical tests on the mean living covers, densities and productivity measurements were employed to compare the reclaimed slopes with the reference area. Additionally, diversity indices of all areas were also calculated so that comparisons of these parameters could also be

made.

Reclaimed Slope '81 *vs.* the P-J Reference Area

When a Student's t-test analysis was employed to compare the mean total living **cover** of the Reclaimed Slope '81 with the Pinyon-Juniper Reference Area, the test suggested that the reclaimed slope was significantly greater than the reference area (Table 13-A). Moreover, when woody species **density** of the two areas were compared by the same statistical analysis, results here also suggested that the number of woody plants per acre for reclaimed slope was greater than that of the reference area. Next, the mean total annual biomass **production** of the two areas were compared and results were consistent – the reclaimed slope had more the 3 times the production of the reference area. This difference was, of course, statistically significant. Finally, two **diversity** indices, *MacArthur's Index* and the *Average Number of Species per Quadrat* of the two areas were compared. The MacArthur's Index of the two areas were very similar (the reference area index was slightly higher); the Average Number of Species per Quadrat was greater for the reclaimed slope (Table 14).

Reclaimed Slope '98 *vs.* the P-J Reference Area

When the total living **cover** of the Reclaimed Slope '98 was compared with the cover of the Pinyon-Juniper Reference Area, Student's t-test suggested that the difference was significant – or the total living cover of the reclaimed slope was significantly greater than the reference area

(Table 13-B). Woody species **density** was also compared of these two areas with the same results – the density of the reclaimed slope was greater. **Production** of the Reclaimed Slope '98 was also significantly greater than the Pinyon-Juniper Reference Area according to a t-test. Finally, when **diversity** indices were compared between the reclaimed slope and reference area, both diversity indices used were greater for the reclaimed slope (Table 14).

DISCUSSION & SUMMARY

Quantitative sampling was conducted in three different plant communities at the Cottonwood Fan Portal Area in Cottonwood Canyon, Emery County, Utah. The sampling was conducted to provide Year 1 of two consecutive sample years required prior to submittal of an application for Phase III Bond Release of the reclaimed areas. The reclaimed areas studied were the Reclaimed Slope '81 and Reclaimed Slope '98. The data from these re-established plant communities have been compared to a Pinyon-Juniper Reference Area, or an area chosen previously to be used to provide revegetation success standards following final reclamation.

Statistical comparison and other indices suggest that the reclaimed areas in the Cottonwood Fan Portal Area have met or exceeded those standards that were pre-determined to be used at the time of final reclamation. The parameters of the reclaimed area that were compared statistically with the reference area were: total living cover, woody species density and annual biomass production. Other parameters that can be compared by a review of the summary tables include: cover by individual plant species and lifeform composition. Finally, diversity of the reclaimed slopes was greater (or nearly equal to) than that of the reference area.

DATA SUMMARY TABLES

Reclaimed Slope '81

Table 1: Cover and frequency by plant species at the Cottonwood Fan Portal area.

RECLAIMED SLOPE '81	MEAN	STD. DEV.	FREQUENCY
SHRUBS			
Artemisia tridentata	17.04	17.55	74.00
Atriplex canescens	6.60	15.73	22.00
Atriplex confertifolia	0.50	3.50	2.00
Chrysothamnus nauseosus	5.20	9.90	32.00
FORBS			
Aster foliaceus	3.60	7.42	24.00
GRASSES			
Bromus inermis	0.80	4.04	4.00
Elymus cinereus	8.46	13.39	42.00
Elymus junceus	4.10	6.71	32.00
Elymus lanceolatus	0.80	2.71	10.00
Elymus smithii	1.20	2.93	16.00

Table 2: Total cover and composition at the Cottonwood Fan Portal area.

RECLAIMED SLOPE ' 81		
A. COVER	MEAN	STD. DEV.
Total Living Cover	48.30	12.91
Litter	12.10	6.01
Bareground	15.50	7.16
Rock	24.10	11.43
B. % COMPOSITION		
Shrubs	60.45	27.35
Forbs	8.10	16.65
Grasses	31.44	24.90

Reclaimed Slope '81 (continued)

Table 3: Woody species density at the Cottonwood Fan Portal area.

RECLAIMED SLOPE '81	*No/Ac*
Artemisia tridentata	3124.74
Atriplex canescens	363.34
Atriplex confertifolia	54.50
Chrysothamnus nauseosus	817.52
TOTAL	**4360.10**

Table 4: Production at the Cottonwood Fan Portal area.

RECLAIMED SLOPE '81		
	Pounds/Acre	
LIFEFORM	MEAN	STD. DEV.
Herbaceous	798.60	596.68
Woody	596.29	551.34
TOTAL	**1394.89**	448.20

Reclaimed Slope '98

Table 5: Cover and frequency by plant species at the Cottonwood Fan Portal area.

RECLAIMED SLOPE '98			
	MEAN	STD. DEV.	FREQUENCY
SHRUBS			
Artemisia nova	0.13	1.02	1.67
Artemisia tridentata	2.25	6.35	15.00
Atriplex canescens	3.58	8.32	26.67
Atriplex confertifolia	0.75	4.06	3.33
Chrysothamnus nauseosus	1.72	4.85	13.33
FORBS			
Achillea millefolium	0.17	1.28	1.67
Aster ascendens	5.83	6.05	60.00
Linus perenne ssp. lewisii	4.40	4.98	53.33
Penstemon palmeri	0.70	2.40	10.00
GRASSES			
Bromus carinatus	0.33	1.55	5.00
Elymus cinereus	13.22	13.51	66.67
Elymus lanceolatus	2.83	5.58	25.00
Elymus salinus	1.25	4.34	8.33
Elymus smithii	5.00	7.07	41.67
Elymus spicatus	1.67	5.22	11.67
Hilaria jamesii	0.08	0.64	1.67
Poa pratensis	0.17	1.28	1.67
Stipa hymenoides	1.17	5.80	5.00

Table 6: Total cover and composition at the Cottonwood Fan Portal area.

RECLAIMED SLOPE '98		
A. COVER	MEAN	STD. DEV.
Total Living Cover	45.25	11.49
Litter	10.33	3.97
Bareground	20.50	8.45
Rock	23.92	11.18
B. % COMPOSITION		
Shrubs	18.93	25.29
Forbs	25.18	19.31
Grasses	55.89	24.12

Reclaimed Slope '98 (continued)

Table 7: Woody species density at the Cottonwood Fan Portal area.

RECLAIMED SLOPE '98	No/Ac
Amelanchier utahensis	10.32
Artemisia nova	185.67
Artemisia tridentata	546.70
Atriplex canescens	1371.90
Atriplex confertifolia	30.95
Cercocarpus ledifolius	10.32
Chrysothamnus nauseosus	660.16
Eriogonum corymbosum	10.32
Rhus aromatica	10.32
Rosa woodsii	30.95
Salix exigua	10.32
Symphoricarpos oreophilus	10.32
TOTAL	**2888.20**

Table 8: Production at the Cottonwood Fan Portal area.

RECLAIMED SLOPE '98

	Pounds/Acre	
LIFEFORM	MEAN	STD. DEV.
Herbaceous	1035.33	620.59
Woody	337.62	524.27
TOTAL	**1372.95**	615.37

Pinyon-Juniper Reference Area

Table 9: Cover and frequency by plant species at the Cottonwood Fan Portal area.

PINYON-JUNIPER REFERENCE AREA

	MEAN	STD. DEV.	FREQUENCY
OVERSTORY			
Pinus edulis	4.08	9.81	16.67
UNDERSTORY			
SHRUBS			
Amelanchier utahensis	0.50	2.69	5.00
Atriplex confertifolia	1.08	4.19	6.67
Chrysothamnus nauseosus	2.17	7.55	10.00
Ephedra viridis	1.58	5.51	10.00
Juniperus osteosperma	1.58	5.51	8.33
Mahonia repens	1.30	4.85	10.00
Pinus edulis	2.00	5.10	16.67
FORBS			
Cryptantha sp.	0.58	1.61	11.67
Descurainia pinnata	0.25	1.09	5.00
Stanleya pinnata	0.62	2.33	8.33
GRASSES			
Elymus salinus	16.25	12.06	53.33
Stipa hymenoides	1.67	4.35	13.33

Table 10: Total cover and composition at the Cottonwood Fan Portal area.

PINYON-JUNIPER REFERENCE AREA

A. COVER	MEAN	STD. DEV.
Overstory Living Cover (o)	4.08	9.81
Understory Living Cover (u)	29.58	8.48
Litter	22.33	12.50
Bareground	14.75	8.96
Rock	33.33	12.67
o + u	33.67	8.84
B. % COMPOSITION		
Shrubs	34.26	37.90
Forbs	5.37	11.25
Grasses	60.37	35.89

Pinyon-Juniper Reference Area (continued)

Table 11: Woody species density at the Cottonwood Fan Portal area.

PINYON-JUNIPER REFERENCE AREA

	No/Ac
Amelanchier utahensis	82.00
Atriplex canescens	3.73
Atriplex confertifolia	44.73
Cercocarpus montanus	14.91
Chrysothamnus nauseosus	149.09
Ephedra viridis	126.73
Eriogonum corymbosum	22.36
Juniperus osteosperma	82.00
Pied Pinus edulis	365.28
Pseudotsuga menziesii	3.73
TOTAL	**894.56**

Table 12: Production at the Cottonwood Fan Portal area.

PINYON-JUNIPER REFERENCE AREA

	Pounds/Acre	
LIFEFORM	MEAN	STD. DEV.
Herbaceous	237.16	148.89
Woody	212.01	291.75
TOTAL	**449.16**	232.97

TABLE 13: Statistical summary sheet for the reclaimed slopes and reference areas at the Cottonwood Fan Portal Area (2007).

A.				
RECLAIMED '81 SLOPE				
Total Living Cover	$\bar{x}$=48.30	s=12.91	n=50	nMIN=19.33
Density	$\bar{x}$=4360.10	s=1952.10	n=60	nMIN=54.24
Production	$\bar{x}$=1394.89	s=448.20	n=100	nMIN=27.94
P-J REFERENCE AREA				
Total Living Cover	$\bar{x}$=33.67	s=8.84	n=60	nMIN=18.65
Density	$\bar{x}$=894.56	s=248.06	n=60	nMIN=20.81
Production	$\bar{x}$=449.16	s=232.97	n=60	nMIN=72.80
STATISTICAL ANALYSES				
Total Living Cover	t=7.024	df=108	SL=p<.001	
Density	t=13.642	df=118	SL=p<.001	
Production	t=15.150	df=158	SL=p<.001	
B.				
RECLAIMED '98 SLOPE				
Total Living Cover	$\bar{x}$=45.25	s=11.49	n=60	nMIN=17.45
Density	$\bar{x}$=2888.20	s=1062.81	n=70	nMIN=36.64
Production	$\bar{x}$=1372.95	s=615.37	n=100	nMIN=54.36
P-J REFERENCE AREA				
Total Living Cover	$\bar{x}$=33.67	s=8.84	n=60	nMIN=18.65
Density	$\bar{x}$=894.56	s=248.06	n=60	nMIN=20.81
Production	$\bar{x}$=449.16	s=232.97	n=60	nMIN=72.80
STATISTICAL ANALYSES				
Total Living Cover	t=6.187	df=118	SL=p<.001	
Density	t=14.195	df=128	SL=p<.001	
Production	t=11.147	df=158	SL=p<.001	

$\bar{x}$= sample mean, s = sample standard deviation, n = sample size,
nMIN= minimum adequate sample (@ 90% ± .10)
NS = non-significant, t = Student's t-value, df = degrees of freedom,
SL = significance level, p = probability level

TABLE 14: Diversity of the Cottonwood Fan Portal Area (2007).

A.
MacArthur's Index ($1/\sum p_i^2$) =

_____Reclaimed Slope '81: 6.207

_____Reclaimed Slope '98: 8.389

_____P-J Reference Area: 6.316

B.
Average No. Species/Quadrat =

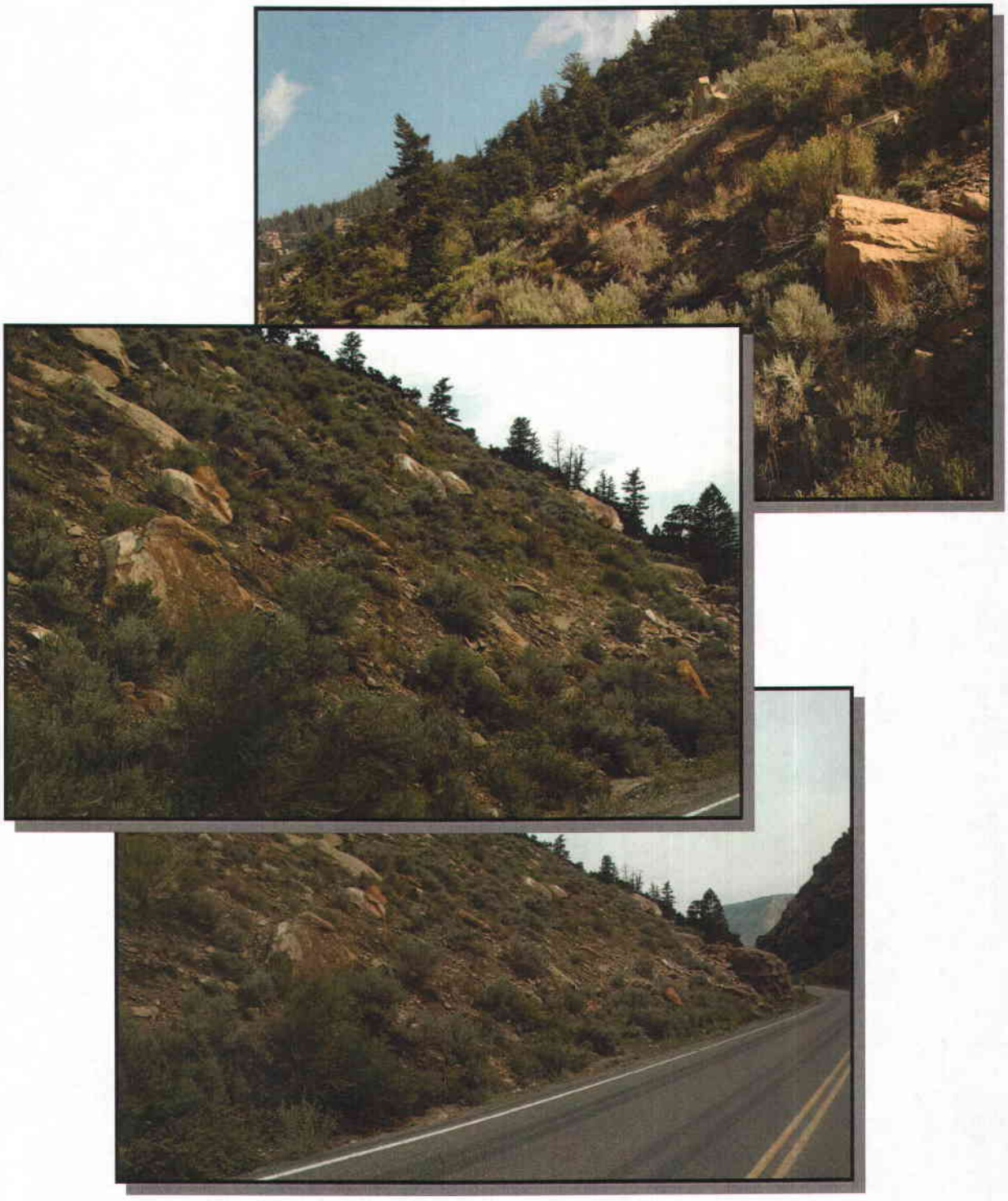
_____Reclaimed Slope '81: 2.58

_____Reclaimed Slope '98: 3.52

_____P-J Reference Area: 1.58

COLOR PHOTOGRAPHS OF THE SAMPLE AREAS

RECLAIMED SLOPE '81



RECLAIMED SLOPE '98

PINYON-JUNIPER REFERENCE AREA

Vegetation Monitoring
For Phase III Bond Release: Year 2
at the
Cottonwood Fan Portal Area
2008

Reclaimed Slope '81
Reclaimed Slope '98
and the
Pinyon-Juniper Reference Area

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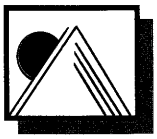

March 2009

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INTRODUCTION

The purpose of this document is to compare reclaimed areas of a mine site with a "reference area", or an area chosen previously to represent final revegetation success standards. The content of this report provides **Year 2** results of the two consecutive years of sampling required prior to submittal of an application for bond release by the mine operator through the State of Utah.

Following final reclamation and revegetation of a mine site, a "*responsibility period*" for at least 10 years is required before the mine operator can submit a request for *Final or Phase III Bond Release* through state and federal regulatory authorities. It has been estimated that this period of time is long enough to determine whether or not adequate re-establishment of a given reclaimed plant community has occurred on sites at this precipitation zone in western United States.

Rehabilitated vegetation is usually monitored throughout the responsibility period, but beginning at year 9 of the 10-year period, intensive sampling can be initiated for two consecutive years to determine whether or not the reclaimed site has met pre-determined revegetation success standards. The vegetation of the reclaimed land must meet specific state and federal requirements as specified by the State of Utah, Division of Oil, Gas & Mining (DOGM) and the Department of Interior, Office of Surface Mining (OSM). As dictated by the rules, vegetative cover must be "*diverse, effective and permanent*". Accordingly, there are often specific requirements associated with cover, density, productivity and diversity of reclaimed lands.

This document provides comparisons for two reclaimed slopes within Energy West's Cottonwood Fan Portal Area – the **Reclaimed Slope '81** and the **Reclaimed Slope '98** – with a native, undisturbed plant community located nearby called the **Pinyon-Juniper Reference Area**.

General Site Description

The Cottonwood Fan Portal Area is located in Cottonwood Canyon, approximately 12 miles northwest of Orangeville, Utah. Elevation of the study sites ranged between 7,100 ft and 7,600 ft above sea level. Slopes of the study areas were relatively steep at approximately 35 degrees with exposures primarily to the west-southwest.

The descriptive name provided for the "Reclaimed Slope '81" implies the slope's general history – it is a reclaimed slope where the plant communities that once existed in the area were disturbed by previous mining activities, then were reclaimed and re-seeded in 1981.

Prior to disturbance, the native vegetation was most likely dominated by pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*), with Salina wildrye (*Elymus salinus*) as the dominant understory species.

Similarly named, the "Reclaimed Slope '98" was also the site of previous disturbance and was reclaimed and re-seeded in 1998. With similar slopes and exposures as the Reclaimed Slope '81, this area was also likely dominated by the same plant species before it was disturbed by mining

activities.

A Pinyon-Juniper Reference Area was chosen earlier to be used to create standards for revegetation success following final reclamation. The reference area was dominated by the same plant species as those listed above for the reclaimed slopes (before they were disturbed). The reference area was chosen earlier to comply with guidelines by DOGM and was thought to have similar slopes, soils, exposure, species composition, precipitation, elevation and other environmental variables.

METHODS

Vegetation establishment on the reclaimed slopes has been monitored for several years following slope reclamation. Sampling methods have remained consistent for all monitoring years and follow those methods suggested in guidelines provided by DOGM.

Transect Placement

Transect lines for quantitative sampling were randomly placed the length of the reclaimed slopes and reference areas to adequately represent each sample area as a whole. From these transect lines, sample locations were chosen using random numbers at right angles to them.

Cover, Frequency and Composition

Cover estimates were made using ocular methods with meter square quadrats. Species composition and relative frequencies were also assessed from the quadrats. Additional information recorded on the raw data sheets were: estimated precipitation, slope, exposure, grazing use, animal disturbance and other appropriate notes. Plant nomenclature follows *"A Utah Flora"* (Welsh et al. 2003).

Density

Density estimates for the woody plant species on the reclaimed slopes and reference area were made using a distance method called the point-quarter method. In this method, random points were placed on the sample sites and measured into four quarters. The distances to the nearest woody plant species were then recorded in each quarter. The average point-to-individual distance was equal to the square root of the mean area per individual.

Production

Total annual biomass production was estimated by clipping, drying and weighing current annual growth in each sample quadrat. "Double sampling" methods were employed by placing four additional quadrats around the clipped quadrat, then estimating the production of them relative to

the clipped plot. Herbaceous and woody species production were recorded separately.

Sample Adequacy

Sample adequacy for cover and density was attempted with the goal that 90% of the samples were within 10% of the true mean for the plant communities in the area. The following formula was used:

$$nMIN = \frac{t^2 s^2}{(dx)^2}$$

where,

nMIN	=	minimum adequate sample
t	=	appropriate confidence t-value
s	=	standard deviation
x	=	sample mean
d	=	desired change from mean

Diversity

Two diversity indices have been reported in this document for the reclaimed area and the reference area. To begin, **MacArthur's Diversity Index** was calculated. This index is an effective diversity measurement and is computed using the equation $1/\sum pi^2$ (MacArthur and Wilson 1976, *The Theory of Island Biogeography,* Princeton: Princeton University Press). In this equation *pi* is the proportion of sum frequency contributed by the *i*th species in the sample area of concern. The proportional contribution of each species is then squared and the values for all species in the sample areas are summed. This index integrates the number of species and the

degree to which frequency of occurrence was equitably distributed among those species. In other words, this index provides greater weight to those species that are present more often (with greater frequency) than those that are merely "present" in one or two quadrats. The **average number of species** per sample quadrat is another measure of species diversity provided from the data in this report.

Photographs

Color photographs were taken of the sample areas and are included in this report.

RESULTS

Reclaimed Slope '81

Quantitative sampling the vegetation on the Reclaimed Slope '81 in 2008 revealed that the area was dominated by sagebrush (*Artemisia tridentata*), Great Basin wildrye (*Elymus cinereus*), fourwing saltbush (*Atriplex canescens*) and Russian wildrye (*Elymus junceus*). For a list of all plant species present in sample quadrats along with their cover and frequency values, refer to Table 1.

The total living cover of this reclaimed slope was estimated at 49.30% (Table 2-A). Of that living

cover, shrubs comprised 55.33% of it, grasses 35.93% and forbs 8.74% (Table 2-B). The total woody species density was estimated at 4,334 individuals per acre and was dominated by sagebrush, rubber rabbitbrush and fourwing saltbush (Table 3). Total annual biomass production of the slope was estimated to be 495.27 pounds per acre, with 270.23 pounds coming from herbaceous species and 225.03 pounds from woody plants (Table 4).

Reclaimed Slope '98

The Reclaimed Slope '98 was dominated by Gt. Basin wildrye, Pacific aster (*Aster ascendens*), western wheatgrass (*Elymus smithii*), Lewis flax (*Linum perenne* ssp. *lewisii*) and fourwing saltbush. For a list of the plant species present in sample quadrats along with their cover and frequency values, refer to Table 5.

The total living cover for this reclaimed slope was estimated to be 43.30% (Table 6-A). The composition of the cover by lifeform was 42.53% grasses, 37.41% forbs and 20.05% shrubs (Table 6-B). Woody species density in this area consisted of 2,205 individuals per acre with the dominants for this parameter consisting of fourwing saltbush, rubber rabbitbrush sagebrush (Table 7). Productivity for the slope estimated at 349.66 pounds per acre with 278.20 pounds coming from herbaceous and 71.46 pounds from woody species (Table 8).

Pinyon-Juniper Reference Area

The reference area chosen earlier to be used for final revegetation success standards was located up-slope from the two reclaimed slopes in an undisturbed pinyon-juniper plant community. This community was also sampled during the same period to enable the results to be compared to the results of the reclaimed slopes.

Overstory cover of the reference area was estimated at 6.90%, all from pinyon pine *(Pinus edulis)*. The understory living cover was dominated by Salina wildrye, pinyon pine, and Mormon tea (*Ephedra viridis*). For a cover and frequency listing of all species present in the sample quadrats refer to Table 9.

The total living cover of the Pinyon-Juniper Reference Area was estimated at 35.40%, of which 28.50% was from understory cover and 6.90% from overstory (Table 10-A). The composition of this cover consisted of 55.02% grasses, 42.25% shrubs and 2.73% forbs (Table 10-B). Woody species density of this area consisted of 1,235 individuals per acre with the most common plants for this parameter consisting of pinyon-pine, Mormon tea and rubber rabbitbrush (Table 11). Total annual biomass production was estimated at 196.19 pounds per acre, or 117.17 pounds from herbaceous plants and 79.02 pounds from woody species (Table 12).

DISCUSSION

Statistical tests on the mean living covers, densities and productivity measurements were employed to compare the reclaimed slopes with the reference area. Additionally, diversity indices of all areas were also calculated so that comparisons of these parameters could also be made.

Reclaimed Slope '81 *vs.* Reference Area

When a Student's t-test analysis was employed to compare the mean total living **cover** of the Reclaimed Slope '81 with the Pinyon-Juniper Reference Area, the test suggested that the reclaimed slope was significantly greater than the reference area (Table 13-A). Moreover, when woody species **density** of the two areas were compared by the same statistical analysis, results here also suggested that the number of woody plants per acre for the reclaimed slope was greater than that of the reference area (Table 13-A). Next, the mean total annual biomass **production** of the two areas were compared and results were consistent – the reclaimed slope had more the 2.5 times the production of the reference area. This difference was, of course, statistically significant (Table 13-A). Finally, two **diversity** indices, *MacArthur's Index* and the *Average Number of Species per Quadrat* of the two areas were compared. In 2008, the MacArthur's Index of the reclaimed slope was higher than the reference area; the Average Number of Species per Quadrat was also greater for the reclaimed slope (Table 14).

Lifeform composition of the understory was calculated and shown on the aforementioned summary tables.

Reclaimed Slope '98 *vs.* Reference Area

When the total living **cover** of the Reclaimed Slope '98 was compared with the cover of the Pinyon-Juniper Reference Area, Student's t-test suggested that the difference was significant – or the total living cover of the reclaimed slope was significantly greater than the reference area (Table 13-B). Woody species **density** was also compared of these two areas with the same results – the density of the reclaimed slope was greater (Table 13-B). **Production** of the Reclaimed Slope '98 was also significantly greater than the Pinyon-Juniper Reference Area according to a t-test (Table 13-B). Finally, when **diversity** indices were compared between the reclaimed slope and reference area, both diversity indices used were greater for the reclaimed slope (Table 14).

SUMMARY

Quantitative sampling was conducted in three different plant communities at the Cottonwood Fan Portal Area in Cottonwood Canyon, Emery County, Utah. The sampling was conducted to provide Year 2 of two consecutive sample years required prior to submittal of an application for Phase III Bond Release of reclaimed areas at a coal mine site. A report was prepared and

submitted previously to Energy West that showed the sample results for the Year 1 sample period. Figures have been prepared for this section to show the data results graphically. Even though the scope of this document was intended to report Year 2 sample results, *the figures were prepared to include both Year 1 (2007) and Year 2 (2008) summaries for a comparison of both sample periods.*

The reclaimed areas studied in 2007 and 2008 were the Reclaimed Slope '81 and Reclaimed Slope '98. The data from these restored plant communities have been compared to a Pinyon-Juniper Reference Area, or an area chosen previously to be used to provide revegetation success standards following final reclamation.

Statistical comparisons and other indices for the 2008 datasets (as well as 2007 reported in a previously mentioned document) suggest that the reclaimed areas in the Cottonwood Fan Portal Area have met or exceeded those standards that were pre-determined to be used at the time of final reclamation. The parameters of the reclaimed areas that were compared statistically with the reference area were: total living cover, woody species density and annual biomass production. Other parameters that can be compared by a review of the summary tables include: cover by individual plant species and lifeform composition. Finally, diversity of the reclaimed slopes was greater (or nearly equal to) than that of the reference area.

FIGURES

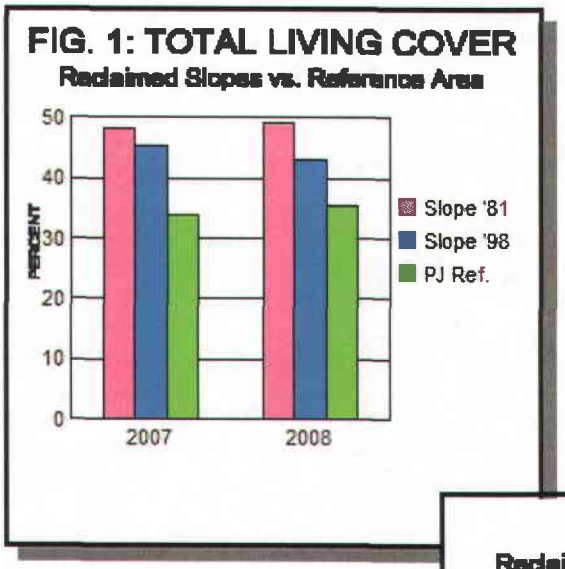


FIG. 1: TOTAL LIVING COVER
Reclaimed Slopes vs. Reference Area
PERCENT
50
40
30
20
10
0
2007
2008
Slope '81
Slope '98
PJ Ref.

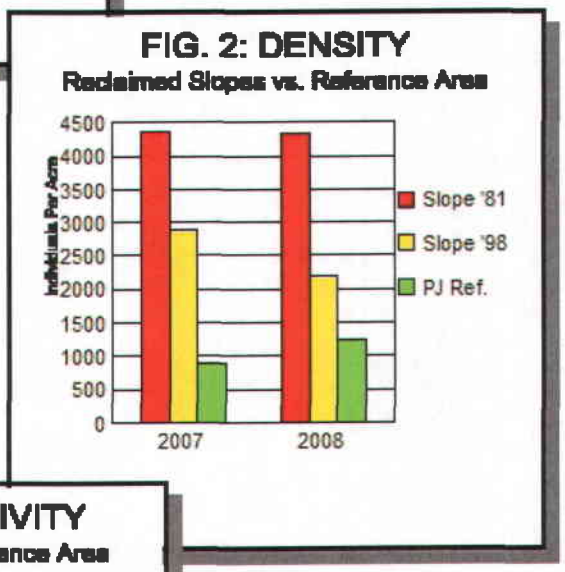


FIG. 2: DENSITY
Reclaimed Slopes vs. Reference Area
Individuals Per Acre
4500
4000
3500
3000
2500
2000
1500
1000
500
0
2007
2008
Slope '81
Slope '98
PJ Ref.

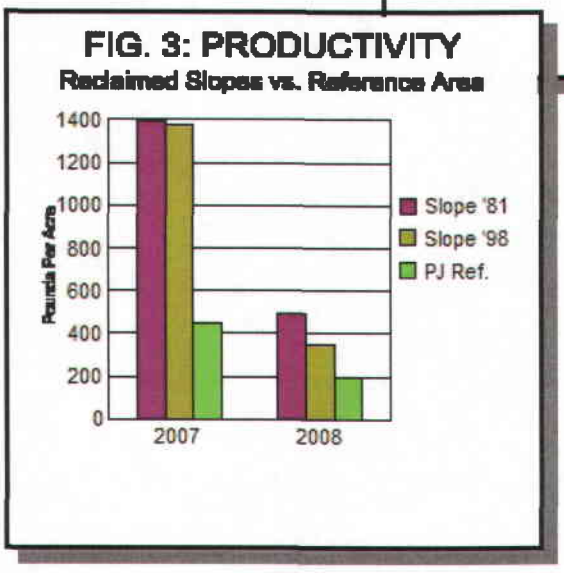


FIG. 3: PRODUCTIVITY
Reclaimed Slopes vs. Reference Area
Pounds Per Acre
1400
1200
1000
800
600
400
200
0
2007
2008
Slope '81
Slope '98
PJ Ref.

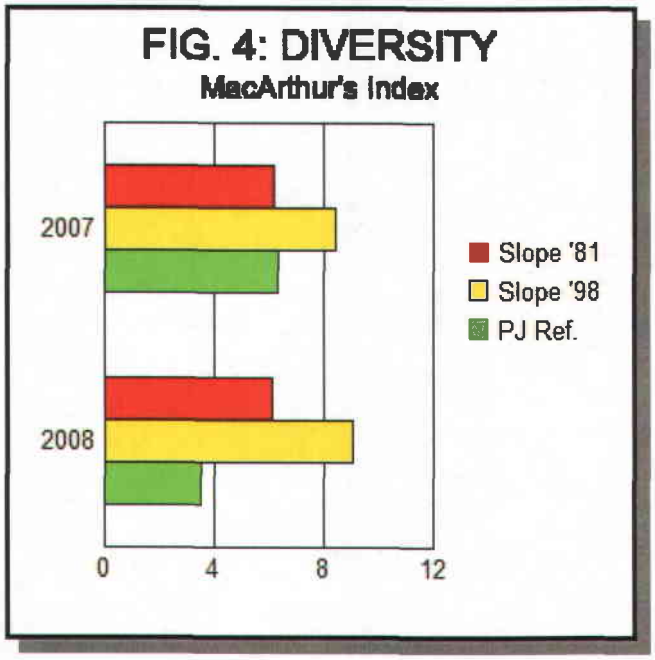


FIG. 4: DIVERSITY
MacArthur's Index
2007
2008
0
4
8
12
Slope '81
Slope '98
PJ Ref.

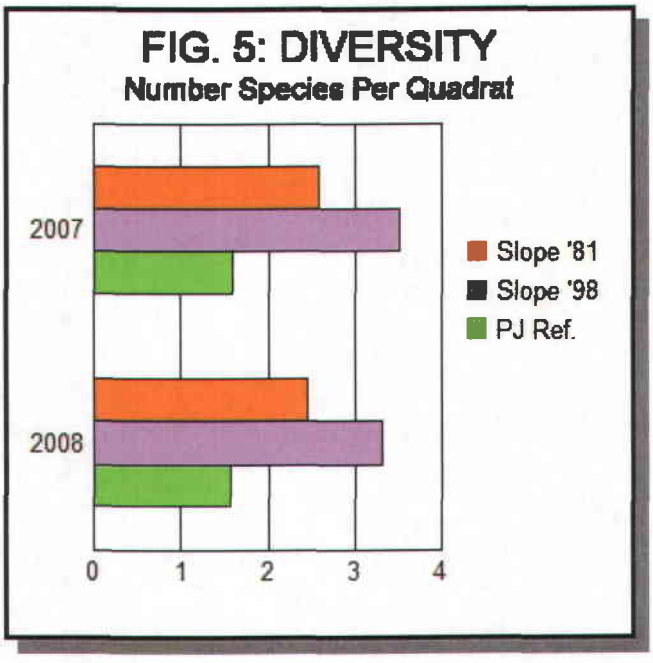


FIG. 5: DIVERSITY
Number Species Per Quadrat
2007
2008
0
1
2
3
4
Slope '81
Slope '98
PJ Ref.

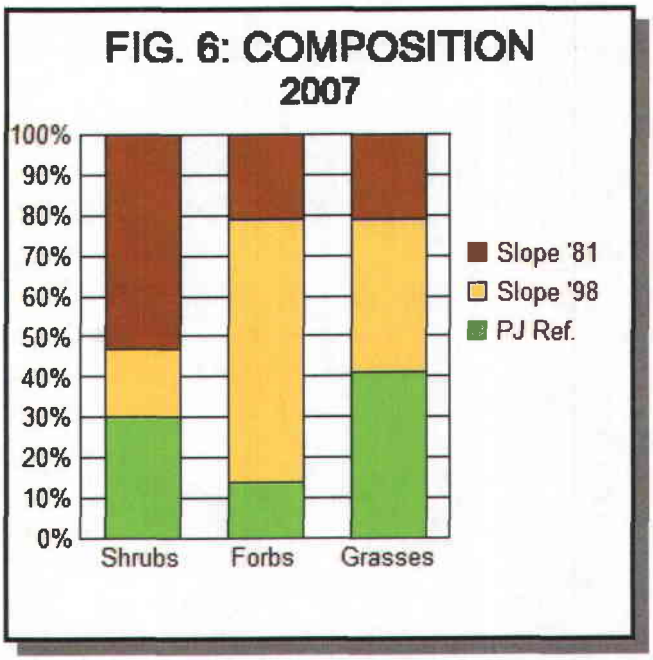


FIG. 6: COMPOSITION
2007
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Shrubs
Forbs
Grasses
Slope '81
Slope '98
PJ Ref.

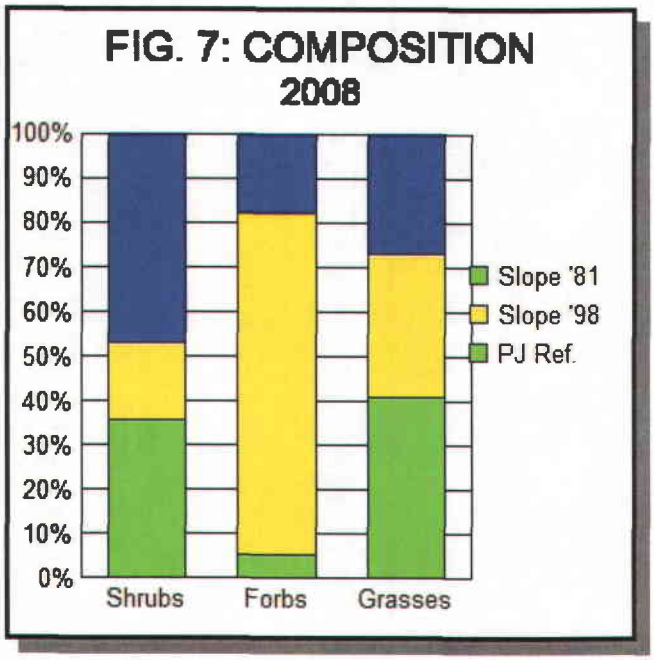


FIG. 7: COMPOSITION
2008
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Shrubs
Forbs
Grasses
Slope '81
Slope '98
PJ Ref.

DATA SUMMARY TABLES

Reclaimed Slope '81

Table 1: Cover and frequency by plant species at the Cottonwood Fan Portal area (2008).

Reclaimed Slope ' 81

	MEAN	STD. DEV.	FREQUENCY
SHRUBS			
Artemisia nova	0.70	4.90	2.00
Artemisia tridentata	16.40	17.38	62.00
Atriplex canescens	6.10	15.47	18.00
Atriplex confertifolia	0.70	3.47	4.00
Chrysothamnus nauseosus	2.90	5.84	22.00
Gutierrezia sarothrae	0.40	2.80	2.00
FORBS			
Aster foliaceous	4.50	9.76	20.00
GRASSES			
Agropyron cristatum	0.80	3.22	8.00
Bromus carinatus	0.66	2.08	10.00
Elymus cinereus	10.44	13.28	54.00
Elymus junceus	5.60	8.40	42.00
Stipa hymenoides	0.10	0.70	2.00

Table 2: Total cover and composition at the Cottonwood Fan Portal area (2008).

Reclaimed Slope ' 81

A. COVER	**MEAN**	**STD. DEV.**
Total Living Cover	49.30	11.71
Litter	14.30	6.17
Bareground	13.40	6.04
Rock	23.00	13.11
B. % COMPOSITION		
Shrubs	55.33	32.74
Forbs	8.74	19.19
Grasses	35.93	27.44

Table 3: Woody species density at the Cottonwood Fan Portal area (2008).

Reclaimed Slope ' 81	*No/Ac*
Artemisia nova	126.39
Artemisia tridentata	2491.77
Atriplex canescens	487.52
Atriplex confertifolia	90.28
Chrysothamnus nauseosus	920.87
Chrysothamnus viscidiflorus	54.17
Ephedra viridis	90.28
Gutierrezia sarothrae	72.23
TOTAL	**4333.52**

Table 4: Production at the Cottonwood Fan Portal area (2008).

Reclaimed Slope ' 81

	Pounds/Acre	
LIFEFORM		
	Mean	Std. Dev.
Herbaceous	270.23	201.82
Woody	225.03	204.52
TOTAL	**495.27**	**212.29**

Reclaimed Slope '98

Table 5: Cover and frequency by plant species at the Cottonwood Fan Portal area (2008).

Reclaimed Slope '98

	MEAN	STD. DEV.	FREQUENCY
SHRUBS			
Artemisia tridentata	2.14	5.14	18.00
Atriplex canescens	5.30	9.97	30.00
Chrysothamnus nauseosus	1.40	4.48	12.00
Rosa woodsii	0.40	1.69	6.00
FORBS			
Achillea millefolium	0.20	1.40	2.00
Aster ascendens	7.60	10.01	56.00
Hedysarum boreale	0.10	0.70	2.00
Linum lewisii	7.36	9.28	56.00
Melilotus officinalis	0.30	1.19	6.00
Penstemon palmeri	0.20	1.40	2.00
GRASSES			
Agropyron cristatum	0.20	1.40	2.00
Bromus tectorum	0.20	1.40	2.00
Dactylis glomeratus	0.50	2.50	4.00
Elymus cinereus	7.80	10.40	50.00
Elymus lanceolatus	2.90	5.39	28.00
Elymus smithii	3.60	7.35	28.00
Elymus spicatus	1.50	4.27	14.00
Poa pratensis	0.10	0.70	2.00
Stipa hymenoides	1.50	4.92	12.00

Table 6: Total cover and composition at the Cottonwood Fan Portal area (2008).

Reclaimed Slope '98

A. COVER	**MEAN**	**STD. DEV.**
Total Living Cover	43.30	8.22
Litter	15.60	8.22
Bareground	19.00	8.25
Rock	22.10	9.06
B. % COMPOSITION		
Shrubs	20.05	22.24
Forbs	37.41	32.81
Grasses	42.53	27.88

Table 7: Woody species density at the Cottonwood Fan Portal area (2008).

Reclaimed Slope '98	*No/Ac*
Amelanchier utahensis	6.13
Artemisia nova	24.50
Artemisia tridentata	630.95
Atriplex canescens	918.87
Atriplex confertifolia	12.25
Chrysothamnus nauseosus	557.45
Eriogonum corymbosum	12.25
Gutierrezia sarothrae	6.13
Pinus edulis	6.13
Rosa woodsii	30.63
TOTAL	**2205.28**

Table 8: Production at the Cottonwood Fan Portal area (2008).

Reclaimed Slope '98

	Pounds/Acre	
LIFEFORM	Mean	Std. Dev.
Herbaceous	278.20	191.61
Woody	74.46	139.17
TOTAL	**349.66**	**172.91**

Table 9: Cover and frequency by plant species at the Cottonwood Fan Portal area.

Pinyon-Juniper Reference Area

	MEAN	STD. DEV.	FREQUENCY
OVERSTORY			
Pinus edulis	6.90	11.87	30.00
UNDERSTORY			
TREES/SHRUBS			
Amelanchier utahensis	0.60	3.10	4.00
Atriplex confertifolia	0.50	3.50	2.00
Chrysothamnus nauseosus	1.16	4.12	8.00
Ephedra viridis	4.10	10.18	16.00
Juniperus osteosperma	0.90	4.44	6.00
Pinus edulis	5.80	10.93	26.00
FORBS			
Cryptantha sp.	0.34	1.37	6.00
Descurainia pinnata	0.16	1.12	2.00
Stanleya pinnata	0.10	0.70	2.00
GRASSES			
Elymus salinus	13.58	11.49	76.00
Stipa hymenoides	1.26	5.31	8.00

Table 10: Total cover and composition at the Cottonwood Fan Portal area.

Pinyon-Juniper Reference Area

A. COVER	MEAN	STD. DEV.
Overstory (O)	6.90	11.87
Understory (U)	28.50	10.01
Litter	27.50	18.95
Bareground	16.36	10.91
Rock	27.64	14.08
O + U	35.40	8.36
B. % COMPOSITION		
Shrubs	42.25	41.84
Forbs	2.73	9.41
Grasses	55.02	40.41

Table 11: Woody species density at the Cottonwood Fan Portal area (2008).

Pinyon-Juniper Reference Area

	No/Ac
Amelanchier utahensis	30.87
Atriplex confertifolia	30.87
Cercocarpus montanus	43.22
Chrysothamnus nauseosus	166.69
Ephedra viridis	401.29
Eriogonum corymbosum	6.17
Juniperus osteosperma	55.56
Pinus edulis	500.07
TOTAL	**1234.74**

Table 12: Production at the Cottonwood Fan Portal area.

Pinyon-Juniper Reference Area

	Pounds/Acre	
LIFEFORM	MEAN	STD. DEV.
Herbaceous	117.17	99.42
Woody	79.02	122.90
TOTAL	**196.19**	**94.00**

TABLE 13: Statistical summary sheet for the reclaimed slopes and reference area at the Cottonwood Fan Portal Area (2008).

A.				
RECLAIMED '81 SLOPE				
Total Living Cover	$\bar{x}$=49.30	s=11.71	n=50	nMIN=15.53
Density	$\bar{x}$=4333.52	s=1844.77	n=60	nMIN=47.30
Production	$\bar{x}$=495.27	s=212.29	n=60	nMIN=49.72
P-J REFERENCE AREA				
Total Living Cover	$\bar{x}$=35.40	s=8.36	n=50	nMIN=15.09
Density	$\bar{x}$=1234.74	s=379.04	n=50	nMIN=25.50
Production	$\bar{x}$=196.19	s=94.00	n=80	nMIN=62.12
STATISTICAL ANALYSES				
Total Living Cover	t=6.831	df=98	SL=p<.001	
Density	t=11.666	df=108	SL=p<.001	
Production	t=11.228	df=138	SL=p<.001	
B.				
RECLAIMED '98 SLOPE				
Total Living Cover	$\bar{x}$=43.40	s=8.22	n=50	nMIN=9.75
Density	$\bar{x}$=2205.28	s=1105.79	n=90	nMIN=68.04
Production	$\bar{x}$=349.66	s=172.91	n=80	nMIN=66.17
P-J REFERENCE AREA				
Total Living Cover	$\bar{x}$=35.40	s=8.36	n=50	nMIN=15.09
Density	$\bar{x}$=1234.74	s=379.04	n=50	nMIN=25.50
Production	$\bar{x}$=196.19	s=94.00	n=80	nMIN=62.12
STATISTICAL ANALYSES				
Total Living Cover	t=4.825	df=98	SL=p<.001	
Density	t=6.005	df=138	SL=p<.001	
Production	t=6.975	df=158	SL=p<.001	

$\bar{x}$= sample mean, s = sample standard deviation, n = sample size,
nMIN= minimum adequate sample (@ 90% ± .10)
NS = non-significant, t = Student's t-value, df = degrees of freedom,
SL = significance level, p = probability level

TABLE 14: Diversity of the Cottonwood Fan Portal Area (2008).

A.
MacArthur's Index ($1/\sum p^2$) =

Reclaimed Slope '81: 6.098

Reclaimed Slope '98: 9.064

P-J Reference Area: 3.509

B.
Average No. Species/Quadrat =

Reclaimed Slope '81: 2.46

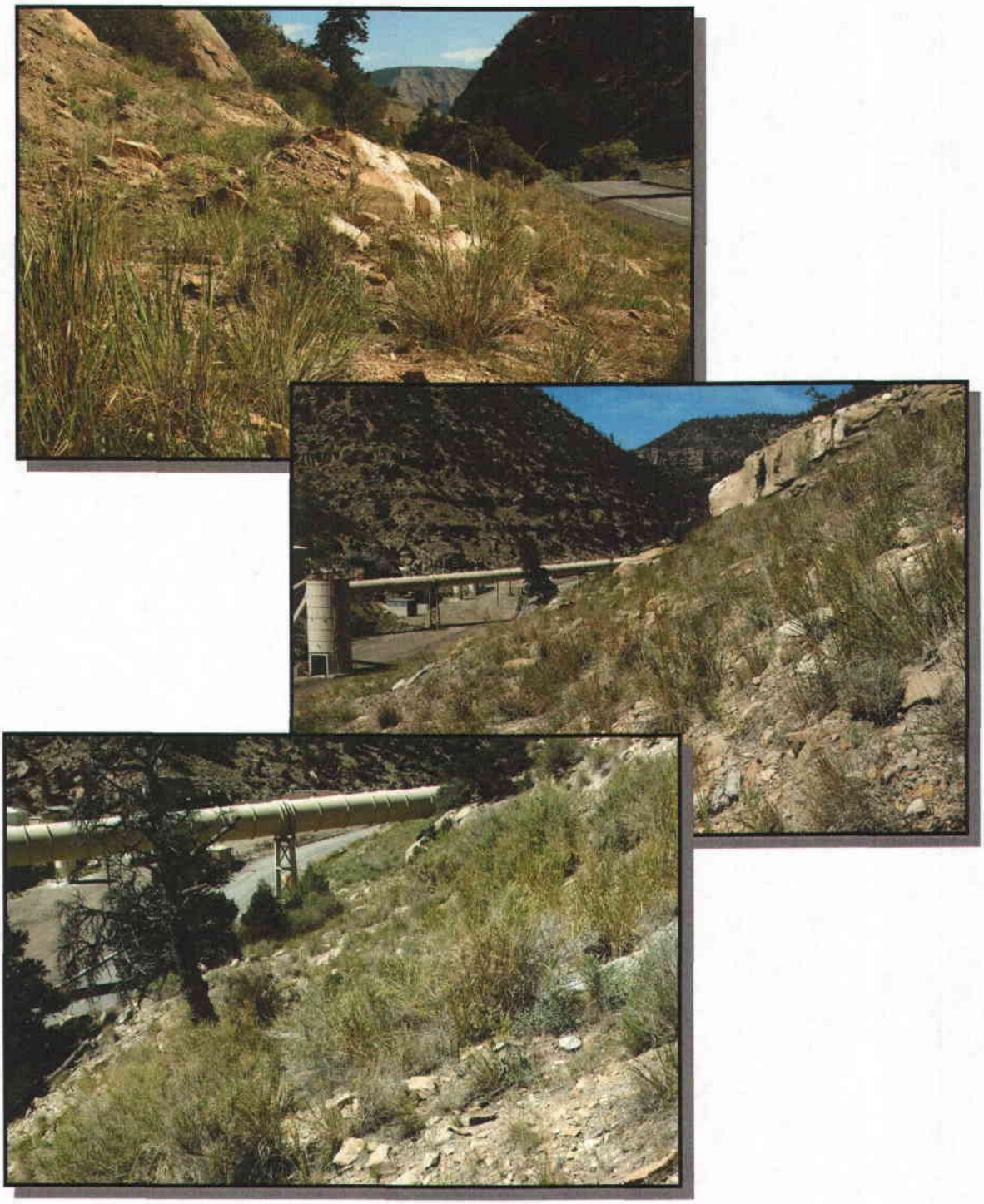
Reclaimed Slope '98: 3.32

P-J Reference Area: 1.56

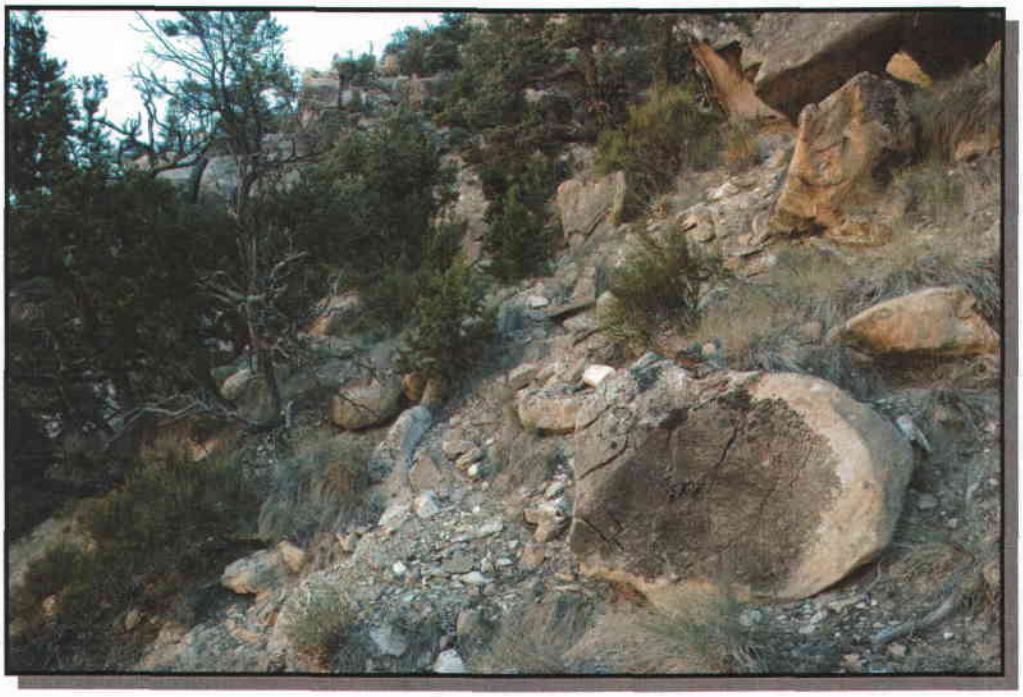
COLOR PHOTOGRAPHS
OF THE
SAMPLE AREAS

RECLAIMED SLOPE '81

RECLAIMED SLOPE '98



PINYON-JUNIPER REFERENCE AREA



Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 9
Demonstration that Area is Not Contributing Suspended Solids Outside Permit Area

Demonstration that Area is Not Contributing Suspended Solids Outside Permit Area

To determine whether the site is contributing suspended solids outside the permit area, typically permittees would utilize RUSLE, a computer modeling program that estimates soil loss and other erosion variables for a user selected site. RUSLE considers four main factors that affect soil erosion and its associated overland flow. These factors are: Climate, Soil, Topography, and Land Use. Since the climate, soil, and topography inputs are relatively similar between the undisturbed (reference) area and the disturbed area, the major factor affecting RUSLE's output, in this instance, is the land use factor.

Land use conditions, as described in the RUSLE2 users manual, describes those conditions that refer to the cover-management practices on the slope as well as supporting practices that might be applied in addition to the cover-management practices. At the Cottonwood Fan Portal Area supporting practices include mulching, tackifying the soil, and severe roughening. All of these supporting practices stabilize the soil, slows runoff, and enhances water infiltration and sediment deposition, reducing soil loss from the site.

Revegetation of the Cottonwood Fan Portal Area was the means by which cover-management was initiated. Vegetation at this has been established for a number of years. In 1981, approximately ½ of the site was reclaimed and reseeded. In 1998, the remainder of the site was reclaimed and reseeded with exception of the two sediment basins at the toe of the slope. In 2002, Energy West submitted a request to the Division to remove the two sediment basins. The basins were removed and all sediment control (silt fences, etc.) were subsequently removed with permission by the Division.

Therefore, to simplify this demonstration, the permittee depends solely on the results of the vegetation sampling of the 1981 reclaimed area and the 1998 reclaimed area. Both of these areas are compared to the Pinyon/Juniper reference area for cover, density, productivity, and diversity. It would come to reason that if these factors are statistically similar or better for the reclaimed areas as compared to the reference area, then it would also seem reasonable to assume that RUSLE would find similar results for off-site soil losses.

As required by bond release procedures, two consecutive years of vegetation sampling is required prior to the submittal of the bond release application. Dr. Patrick Collins of Mt. Nebo Scientific performed this sampling to determine whether the vegetation has met success standards or not. Sampling was conducted in 2007 and 2008 during the late summer, early fall time of the year.

Results of the 2007 and 2008 vegetation sampling found that for cover, density, productivity, and diversity, all reclaimed areas have higher numbers (better growth), when employing statistical analysis, then the reference area. The figures on the following pages graphically illustrate the results for both sampling years.

FIGURES

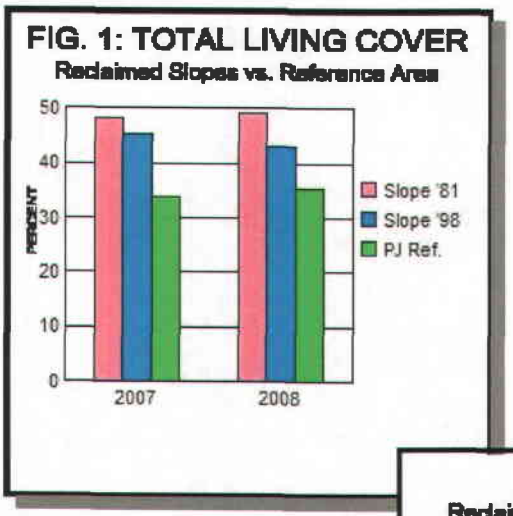


FIG. 1: TOTAL LIVING COVER
Reclaimed Slopes vs. Reference Area
PERCENT
50
40
30
20
10
0
2007
2008
Slope '81
Slope '98
PJ Ref.

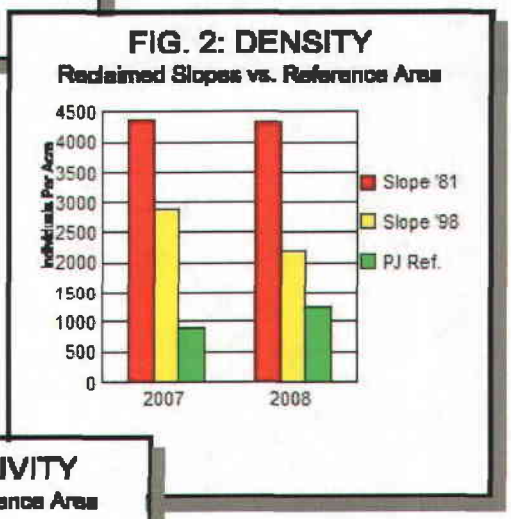


FIG. 2: DENSITY
Reclaimed Slopes vs. Reference Area
4500
4000
3500
3000
2500
2000
1500
1000
500
0
2007
2008
Slope '81
Slope '98
PJ Ref.

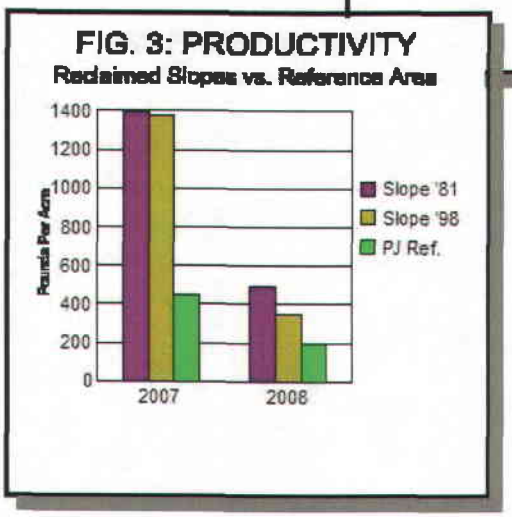


FIG. 3: PRODUCTIVITY
Reclaimed Slopes vs. Reference Area
1400
1200
1000
800
600
400
200
0
2007
2008
Slope '81
Slope '98
PJ Ref.

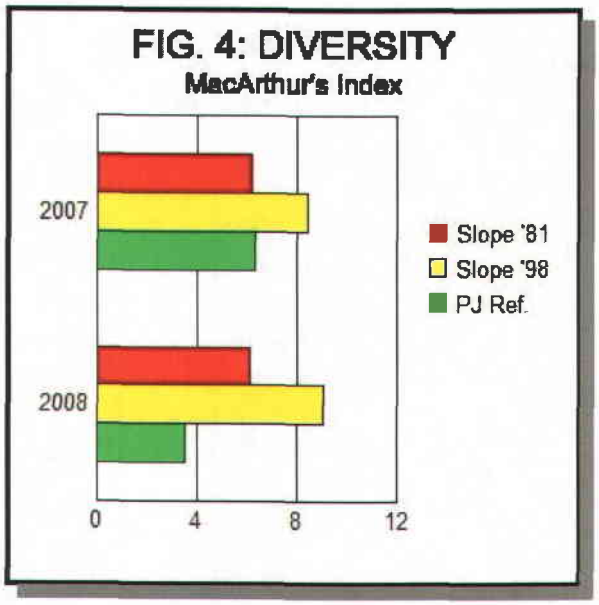


FIG. 4: DIVERSITY
MacArthur's Index
2007
2008
0
4
8
12
Slope '81
Slope '98
PJ Ref.

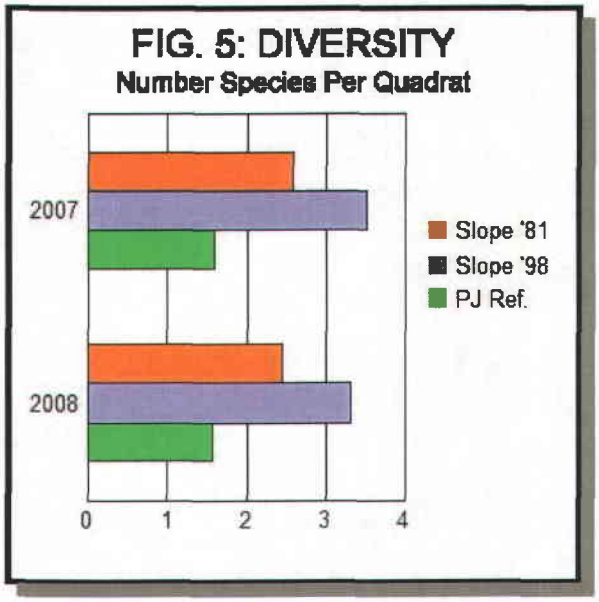


FIG. 5: DIVERSITY
Number Species Per Quadrat
2007
2008
0
1
2
3
4
Slope '81
Slope '98
PJ Ref.

As illustrated from the figures, cover, density, productivity, and diversity were higher in the reclaimed areas then the reference area. The actual data results for the 2008 sampling in the '81 reclaimed area found that total living cover was 49.3% comprising mostly of shrubs. Woody species density was 4,334 individuals per acre and dominated by sagebrush. Productivity was 495.27 pounds per acre.

For the '98 reclaimed area, total living cover was 43.3% in which was compromised mostly by grasses. Woody species density was 2,205 individuals per acre consisting of fourwing saltbrush, rubber rabbitbrush, and sagebrush. Productivity was 349.66 pounds per acre.

The Pinyon/Juniper reference area found total living cover to be 35.4%. Approximately 28.5% was understory cover consisting mainly of grasses. Woody species density was 1,235 individuals per acre and being composed of pinyon-pine, Mormon tea, and rubber rabbitbrush. Total biomass production was 196.19 pounds per acre.

Reviewing these results, the only conclusion that can be made is that the reclaimed area has succeeded the vegetation growth of the reference area. Therefore, erosion and sedimentation of the reclaimed area will be equal to or less then background levels. And the demonstration that the area is not contributing additional suspended solids off the Cottonwood Fan Portal Area has been made.

Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 10
Demonstration that Responsibility Period has been Met

Demonstration that Responsibility Period has been Met

As stated in the Utah Coal Regulations, R645-301-357 Revegetation: Extended Responsibility Period:

357.100. The period of extended responsibility for successful vegetation will begin after the last year of augmented seeding, fertilization, irrigation, or other work, excluding husbandry practices that are approved by the Division in accordance with paragraph R645-301-357.300.

There has been no augmented seeding at the Cottonwood Fan Portal Area except for the sediment basins reclamation.

357.200. Vegetation parameters identified in R645-301-356.200 will equal or exceed the approved success standard during the growing seasons for the last two years of the responsibility period. The period of extended responsibility will continue for five or ten years based on precipitation data reported pursuant to R645-301-724.411, as follows:

357.210. In areas of more than 26.0 inches average annual precipitation, the period of responsibility will continue for a period of not less than five full years.

357.220. In areas of 26.0 inches or less average annual precipitation, the period of responsibility will continue for a period of not less than ten full years.

Meteorological weather data has been collected by PacifiCorp since 1980 (refer to Annual Report.) This data indicates that the 26 year average annual precipitation for the East Mountain area, which includes the Cottonwood/Wilberg Mine Site, is 12.9 inches. Since this amount is less than 25 inches, SMCRA specifies that the responsibility period [for Energy West mines] will be ten full years. The ten year responsibility period was completed in full for the Cottonwood Fan Portal site in July of 2008.

Vegetation monitoring for Phase II and III bond release occurred in 2007 and 2008. The standards of success for this area are as outlined in Volume 2, Part 4 of the Cottonwood/Wilberg MRP:

<u>Sampling for Ten Year Responsibility Period and Bond Release</u>

1. *All sampling will be undertaken in the late summer for maximum plant growth.*
2. *The line intercept or ocular estimation methods will be used to measure cover and species composition.*
3. *The point-center quarter method will be used to measure shrub and tree density.*
4. *Sample size for ground cover and shrub density will be tested at a 90 percent confidence level using a one-tail "t" test with a 10 percent change in the mean.*
5. *Productivity measurements will be a double sampling procedure of clipped plots and ocular estimates. Rectangular plots (6.27" x 100") will be randomly located in reference areas and revegetation sites. Sampling will be at the 90% confidence level.*

6. *The reference areas will be checked to detect any changes from man-induced activities and to verify they are in fair or better condition.*
7. *Revegetation Success:*
   a. *Sampling of reference sites at end of ten year responsibility period will be conducted concurrently with final reclamation sampling, using the same methodology. The range condition of all reference areas will be re-assessed in 1989. This will be repeated every five year.*
   b. *Ground cover is established for two consecutive years at the end of responsibility period at 90 percent of reference site ground cover.*
   c. *At least 80% of the shrubs and trees will have been in place for a least 8 growing seasons, the tree or shrub is alive and healthy.*
   d. *The woody plants established on the revegetated site are equal to or greater than 90 percent of the stocking of live woody plants of the same life form of the approved reference areas with 90 percent statistical confidence.*
   e. *Productivity will equal 90 percent of that of the reference areas at 90 percent statistical confidence.*
   f. *A one-tail students "t" test of the sample means will be used for the statistical test.*

Refer to Attachment 8 for both year 9 and year 10 vegetation monitoring reports.

Application for Phase II and III Bond Release
Cottonwood Fan Portal Site

Attachment 11
Demonstration that Post Mining Land Use has been Achieved

Demonstration that Post Mining Land Use has been Met

Land use for the Wilberg Mine was established in the early 1980's as grazing and wildlife. This land use information is found in Volume 2, Part 2, starting on page 175 of the mining and reclamation plan. However, the Cottonwood Fan Portal Area is on fee land and the owner has never determined its postmining land use. Therefore, the land use will be that use of the surrounding adjacent areas of grazing and wildlife.

Since all success standards for vegetation establishment have been met, land uses for grazing and wildlife have been met as demonstrated by a successful vegetative stand in the Cottonwood Fan Portal Area.